REMARKS

Favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

A. Examiner Interview Summary

Initially, the Applicant wishes to thank Examiner John Brusca and Supervisory Examiner Ardin Marschel for their courtesy and assistance provided to Professor Southern and his representatives during the personal interview held on June 9, 2006. Each of the grounds of rejection set forth in the Official Action were discussed during the interview. The Examiner indicated that the objection to the Information Disclosure Statements filed on 08 December 2005 and 20 December 2005 is withdrawn. The Applicant acknowledges with thanks the indication of the Examiner that he will consider the cited references. The Examiner questioned support in the specification for the recitation ""known nucleotide sequence of the gene". See page 4, line 18 to page 5, line 18; page 10, line 19 to page 11, line 8; and Examples 4 and 6 on pages 21 and 23 of the original specification. In addition reasons were discussed why the pending and amended claims do not interfere U.S. Patent No. 5,744,305 within the meaning of 37 C.F.R. 41 et al. The discussions are described hereinbelow in more detail.

The foregoing amendments clarify claims 17 and 29 to make clear that the terminal nucleotide is directly bound to the support surface, usually through a linker, in response to the Examiner's question raised during the interview. Claims 20, 44 and 78 are amended to replace the Greek character for micron with the word micron. Claims 34 and 35 are amended to delete the term "many", which amended claim is deemed to be better supported by the specification at page 4, line 25. Claim 98 is amended to insert the recitation that the oligonucleotides contain "predetermined" sequences so as to correspond to the wording of the other independent claims. The term "predetermined" corresponds to the same claim recitations found in the independent claims of U.S. Patent No. 5,700,637 and U.S. Patent No. 6,054,270. Such claim recitations were added to the claims of the '637 and '270 patents after interviews with Examiner Ardin Marschel in each application. In those applications the Examiner had contended that the former claim

recitation regarding the oligonucleotides having "defined" sequences may have been indefinite in that any polynucleotide sequence is inherently capable of being defined. The Examiner agreed that the recitation of the oligonucleotides having predetermined sequences was definite and helped to define over the prior art. As stated in the reasons for allowance by the Examiner in the application issuing as the '270 patent, "... the phrase "predetermined sequences" ... is interpreted to require that the complete sequence of each and every oligonucleotide probe on the array surface is known during the practice of the instant claim steps." A copy of the Examiner's Reasons for Allowance in the '270 patent is enclosed for the Examiner's convenience.

B. Responsive to the Official Action dated February 10, 2006

Turning to the Official Action, claims 40-95 are held to be withdrawn as directed to subject matter not elected by original presentation. Claims 40-42, 57-61, 63-64, 68, 88-89, 91 and 95 are amended to as to be dependent upon elected claims 17, 18 or 19. Rejoinder is respectfully solicited upon an indication of allowability of the elected claims.

Claims 17, 20, 25, 26 and 39 are provisionally rejected on the ground of obviousness-type double patenting over claims 17-42 of copending application Serial No. 10/115,077.

As discussed during the interview, Applicant respectfully requests that this provisional ground of rejection be held in abeyance until all other grounds of rejection are deemed to be overcome.

Claims 17, 19, 21-24 and 26 are rejected under 35 U.S.C. 102 as unpatentable over U.S. Patent No. 4,994,373 to Stavrianopoulos et al. This ground of rejection is respectfully traversed as discussed during the interview.

The cited reference fails to disclose or suggest the pending claims. Each of the pending claims require that the oligonucleotides of the array have predetermined sequences. Such feature is neither disclosed nor suggested by the cited reference.

The cited Stavrianopoulos patent (U.S. 4,994,373) describes products in the opposite orientation i.e. where a nucleic acid to be analyzed is immobilized on a support and a nucleic acid with a known sequence is applied to the immobilized sequence (a "target down" assay). None of the products disclosed by Stavrianopoulos has an immobilized oligonucleotide with a

predetermined sequence. The immobilized sequences in the Stavrianopoulos method are the analyte having an unknown sequence rather than the known oligonucleotide. In contrast, in the instant invention, the complete sequence of each and every useful immobilized oligonucleotide probe on the array surface is known.

Moreover, where Stavrianopoulos mentions a "parallel" analysis system, the analyte sequences are immobilized in different reaction containers e.g. different wells of a microtitre plate. The Applicant does not agree that different wells on a plate would be "an impermeable surface" of a support; rather, they are separate surfaces. For example, a sample applied to one well would not be able to hybridize to nucleic acids in another well, because the immobilized nucleic acids are on separate surfaces. The claims would encompass a situation where an array of multiple different sequences was immobilized within a single well of a microtiter plate, such that a sample could hybridize to multiple oligonucleotides within a single well, but they do not encompass the situation where (as disclosed in Stavrianopoulos) there is a single immobilized sequence per well.

It was discussed during the interview whether adding a recitation that the surface is "planar" or "flat" might help to distinguish the claimed apparatus from Stavrianopoulos. However the Examiner raised doubt whether such recitations would clearly distinguish over the wells of the reference in view of the lack of precision of the terms. Accordingly, such potential amendments have not been effected, and it is respectfully submitted that such potential amendments are unnecessary, in view of the claim recitations that the oligonucleotides have "predetermined" sequences. The cited prior art quite clearly fails to disclose or suggest making an apparatus having oligonucleotides containing predetermined sequences, such that the complete sequence of each and every useful immobilized oligonucleotide probe on the array surface is known.

Accordingly, this ground of rejection is deemed to be overcome.

Claims 17, 18 and 38 are rejected under 35 U.S.C. 103 as unpatentable over U.S. Patent No. 4,994,373 to Stavrianopoulos et al. in view of Cooke et al. This ground of rejection is respectfully traversed as discussed during the interview.

Cooke et al. fails to remedy the deficiencies of Stavrianopoulos et al. Cooke et al. fails to disclose or suggest an array having oligonucleotides containing predetermined sequences.

Accordingly, this ground of rejection is deemed to be overcome.

Claims 17 and 25 are rejected under 35 U.S.C. 103 as unpatentable over U.S. Patent No. 4,994,373 to Stavrianopoulos et al. in view of Suggs et al. This ground of rejection is respectfully traversed as discussed during the interview.

Suggs et al. fails to remedy the deficiencies of Stavrianopoulos et al. Suggs et al. fails to disclose or suggest an array having oligonucleotides containing predetermined sequences.

Accordingly, this ground of rejection is deemed to be overcome.

Claims 96, 98 and 99 are rejected under 35 U.S.C. 103 as unpatentable over Stavrianopoulos et al. in view of Caulfield et al.

Caulfield et al. fails to remedy the deficiencies of Stavrianopoulos et al. Caulfield et al. fails to disclose or suggest an array having oligonucleotides containing predetermined sequences.

Accordingly this ground of rejection is deemed to be overcome.

Claim 97 is rejected under 35 U.S.C. 103 as unpatentable over Stavrianopoulos et al. in view of Cooke et al. and further in view of Caulfield et al. This ground of rejection is respectfully traversed.

Caulfield et al. fails to remedy the deficiencies of Stavrianopoulos et al. and Cooke et al. Caulfield et al. fails to disclose or suggest an array having oligonucleotides containing predetermined sequences.

Accordingly this ground of rejection is deemed to be overcome.

Lastly claims 17 and 39 are rejected under 35 U.S.C. 103 as unpatentable over Stavrianopoulos et al. in view of WO 85/01051 to Molecular Biosystems. (Please note that the reference number is incorrectly recited as WO 85/01050 in the Action). This ground of rejection is respectfully traversed.

WO 85/01051 fails to remedy the deficiencies of Stavrianopoulos et al. WO 85/01051 fails to disclose or suggest an array having oligonucleotides containing predetermined sequences.

Accordingly this ground of rejection is deemed to be overcome.

Applicant expresses appreciation for the Examiner's indication of allowable subject matter in claims 27-37.

However in view of the foregoing, it is believed that each ground of rejection set forth in the Official Action of all claims has been overcome and that the application is now in condition

for allowance. Accordingly, such allowance is solicited.

C. Regarding No Potential Interference of Southern Claims with US 5,744,305

During the interview, there was a discussion why the claims of this application should not be considered to interfere with the claims of US 5,744,305. The following is a detailed discussion of this issue, which is presented at this time in an effort to avoid an interference with the '305 patent and to expedite allowance.

Two-Way Test for Interference-in-Fact
Application Serial No. 09/422,804 Compared to US 5,744,305

An interference exists if the subject matter of a claim of one party would, if prior art, have anticipated or rendered obvious the subject matter of a claim of the opposing party and vice versa. See 37 CFR § 41.203(a) and MPEP § 2301.03. This rule and the MPEP set forth the two-way test for patentability, which is as follows:

Assuming that party A's claim is prior art, party A's claim would either anticipate or render obvious party B's claim and assuming that party B's claim is prior art, party B's claim would anticipate or render obvious party A's claim. If this test is met, then an interference in fact exists.

As shown below, the two-way test is not met. Therefore an interference-in-fact would not exist between the claims of Southern Serial No. 09/422,804 and Fodor US Patent No. 5,744,305.

Independent Claims

SN 09/422,804	US 5,744,305
Claim 17. An array of oligonucleotides comprising a support having an impermeable surface to which a plurality of oligonucleotides **containing predetermined sequences** are attached, the oligonucleotides having different nucleotide sequences and **being attached at different known locations** on the	1. An array of oligonucleotides, the array comprising: a planar, non-porous solid support having at least a first surface; and a plurality of different oligonucleotides attached to the first surface of the solid support at a density exceeding 400 different

surface of the support, **wherein the oligonucleotide at one know location is different from the oligonucleotide at another known location**.	oligonucleotides/cm^2, wherein **each of the different oligonucleotides is attached** to the surface of the solid support in a **different predefined region, has a different determinable sequence**, and is at least 4 nucleotides in length. [Emphasis added.]
18. An array of oligonucleotides containing **different predetermined sequences,** comprising a support having a surface to which the oligonucleotides are attached, wherein the oligonucleotides having different nucleotide sequences are attached at between 72 and 1.1 x 10^{12} **different known locations on the surface of the support**.	15. An array of polynucleotides, the array comprising: a planar, non-porous solid support having at least a first surface; and a plurality of different polynucleotides attached to the first surface of the solid support at a density exceeding 400 different polynucleotides/cm^2, wherein **each of the different polynucleotides is attached** to the surface of the solid support in a **different predefined region, has a different determinable sequence**, and is at least 4 nucleotides in length. [Emphasis added.]
19. An array of oligonucleotides for analysing mutations of a gene having a known nucleotide sequence, comprising a support having an impermeable surface to which are attached at **different known locations a set of overlapping or partly overlapping or non-overlapping oligonucleotides containing predetermined sequences** which are complementary to a segment of the known nucleotide sequenece of the gene.	

The Southern application contains claims 17-99, claims 40-99 having been withdrawn from consideration. Claims 17-19 are independent. Claims 20-39 depend the independent claims.

The Fodor patent contains claims 1-26. Claims 1 and 15 are independent. Claims 2-14 depend from claim 1 and claims 16-26 depend from claim 15. Independent claims 1 and 15 and those dependent thereon differ in only one respect. Claim 1 recites oligonucleotides whereas claim 15 recites polynucleotides.

I. Significant differences between Southern's claims and Fodor's patent claims

A. The nucleotides of all the Southern claims have predetermined sequences whereas the nucleotides of all the Fodor claims have determinable sequences.

Southern's claims 17-19 recite "predetermined sequences"—that is the complete sequence of each and every oligonucleotide probe on the array surface is known. See the Examiner's Statement of Reasons for Allowance, which appears on pages 4 and 5 of the Notice of Allowability (Paper No. 26 of Southern application, Serial No. 08/925,676, now US Patent No. 6,054,270). The statement reads, in part, as follows:

> Lastly, it is noted that the phrase "predetermined sequences" as present in several of the instant claims, such as claim 36, line 5, for example, is interpreted to require that the complete sequence of each and every oligonucleotide probe on the array surface is known during the practice of the instant claim steps.

This "predetermined sequences" recitation also appears in dependent claims 20-39, because these claims depend from claims 17 and/or 18 and/or 19.

On the other hand, Fodor's independent claims 1 and 15 recite that each of the different nucleotides has "a different determinable sequence"—That is capable of being determined. This recitation also appears in dependent claims 2-14, which depend from independent claim 1 and in dependent claims 16-26, which depend from independent claim 15.

B. The Southern claims are open to the possibility that the different locations may contain identical sequences of oligonucleotides, whereas the Fodor claims recite that each predefined region contains an oligonucleotide, which is different from any oligonucleotide in each of the other predefined regions.

Southern's independent claim 17 recites an array comprising a plurality of oligonucleotides attached at different known locations, wherein the oligonucleotide at one known location is different from the oligonucleotide at another known location. This claim is open to the possibility that two or more known locations may contain identical oligonucleotides. This recitation also appears in dependent claims 20-39, because these claims depend from claim 17.

Southern's claim 18 recites an array of oligonucleotides comprising a support having a surface to which the oligonucleotides are attached, wherein oligonucleotides having different

nucleotide sequences are attached at different known locations on the surface of the support. This claim is open to the possibility that two or more known location(s) may contain identical oligonucleotides. This recitation also appears in dependent claims 20-35, 37, and 39, because these claims depend from claim 18.

Southern's claim 19 recites an array of oligonucleotides comprising a support having an impermeable surface to which a set of overlapping or partly overlapping or non-overlapping oligonucleotides containing predetermined sequences are attached at different known locations. This claim recites that two or more different known locations may contain identical (overlapping) oligonucleotides. This recitation also appears in dependent claims 20-33, 36, 37, and 39, because these claims depend from claim 19.

Thus, all the Southern claims recite or are open to the possibility that identical oligonucleotides may be present in two or more different known locations.

On the other hand, Fodor's independent claim 1 recites a plurality of different oligonucleotides (exceeding 400 oligonucleotides/cm^2) and Fodor's independent claim 15 recites a plurality of different polynucleotides (exceeding 400 polynucleotides/cm^2), where each of the different oligonucleotides and polynucleotides is attached to the support in a different predefined region, i.e., all the oligonucleotides and all the polynucleotides of Fodor's claims 1 and 15 are different and none can be the same in two or more predefined regions. This recitation also appears in dependent claims 2-14 and 16-26. Thus, the Fodor claims 1-14 require an array of different oligonucleotides and claims 15-26 require an array of different polynucleotides.

II. Application of the two-way test to the Southern claims, assuming that the claims are prior art to Fodor.

In Section I, supra, Southern pointed out two significant differences between the Southern claims and the Fodor claims. Below, Southern analyzes these two differences and applies each of them to the two-way patentability test. From this, it should be clear that the Southern claims, if they were prior art, would not anticipate or render obvious Fodor's claims 1-26. Thus, one branch of the two-way test is not met and there is no interference-in-fact.

A. The nucleotides of the Southern claims have predetermined sequences whereas the nucleotides of the Fodor claims have determinable sequences.

a). Assuming that Southern's claims 17-39 were prior art, these Southern claims would

not anticipate Fodor's claims 1 to 26.

Claims 17-39 recite that the oligonucleotides have predetermined sequences, i.e., the complete sequence of each and every oligonucleotide on the array surface is known. See the Examiner's Statement of Reasons for Allowance, supra. Nowhere do the Sourthern claims teach that each nucleotides has "a different determinable sequence," that is, a sequence capable of being determined, as recited in Fodor's claims 1-26. For that reason, the Southern claims would not anticipate the Fodor claims.

b). Assuming that Southern's claims 17-39 were prior art, the Southern claims would not render obvious Fodor's claims 1 to 26. While there may be prior art which may show oligonucleotides containing different determinable sequences, there is no motivation to modify the Southern claims with this prior art.

B. The Southern claims recite or are open to the possibility that two or more locations on the surface of the support may contain identical sequences of oligonucleotides, whereas the Fodor claims recite that each predefined region contains an oligonucleotide, which is different from any oligonucleotide in each of the other predefined regions.

a). Assuming that Southern's claims 17-39 were prior art, these Southern claims would not anticipate Fodor's claims 1 to 26.

Claims 17 and 18 are open to the possibility that that two or more known locations may contain identical oligonucleotides. Claim 19 recites that two or more different known locations may contain identical (overlapping) oligonucleotides. Nowhere do these Southern claims teach that the sequence of the oligonucleotides in a known location must be different from the sequence of the oligonucleotides in all other known locations, as recited in Fodor's claims 1-26. For that reason, the Southern claims would not anticipate the Fodor claims.

b). Assuming that Southern's claims 17-39 were prior art, these Southern claims would not render obvious Fodor's claims 1 to 26. While there may be prior art which may teach that two or more known locations may contain sequences of oligonucleotides which are identical, there is no motivation to modify the Southern claims, which are open to the possibility or which recite that two or more known locations may have identical sequences of oligonucleotides, with this prior art.

III. Application of the two-way test to the Fodor Claims, assuming that the Fodor claims

are prior art to the Southern claims

In Section I, supra, Southern pointed out two significant differences between the Southern claims and the Fodor claims. In Section II, supra, Southern showed the Southern claims, assuming that they are prior art to the Fodor claims, would not anticipate or render obvious the Fodor claims. Conversely, assuming that the Fodor claims were prior art, the Fodor claims would not anticipate or render obvious Southern's claims 17-39, because (1) the oligonucleotides and polynucleotides of the Fodor claims have determinable sequences whereas the nucleotides of the Southern claims have predetermined sequences and (2) the Fodor claims recite that each predefined region contains an oligonucleotide, which is different from any oligonucleotide in each of the other predefined regions, whereas the Southern claims are open to the possibility, or recite, that two or more locations on the surface of the support may contain identical sequences of oligonucleotides.

A. The nucleotides of the Fodor claims have determinable sequences whereas the nucleotides of the Southern claims have predetermined sequences.

a). Assuming that Fodor's claims 1 to 26 were prior art, these Fodor claims would not anticipate Southern's claims 17-39.

The Fodor claims recite that each of the different nucleotides has "a different determinable sequence"—that is capable of being determined. Nowhere do these claims teach that each nucleotides has a "predetermined sequence," that is, the complete sequence of each and every oligonucleotide probe on the array surface is known. See the Examiner's Statement of Reasons for Allowance, supra. For that reason, the Fodor claims would not anticipate the Southern claims 17-39.

b). Assuming that Fodor's claims 1 to 26 were prior art, the Fodor claims would not render obvious Southern claims 17-39. While there may be prior art which may show oligonucleotides containing different predetermined sequences, there is no motivation to modify the Fodor claims with this prior art.

B. The Fodor claims recite that each predefined region contains an oligonucleotide, which is different from any oligonucleotide in each of the other predefined regions, whereas the Southern claims are open to the possibility, or recite, that two or more locations on the surface of the support may contain identical sequences of oligonucleotides.

a). Assuming that Fodor's claims 1 to 26 were prior art, these Fodor claims would not anticipate Southern's claims 17-39.

The Fodor claims recite that each predefined region contains an oligonucleotide, which is different from any oligonucleotide in each of the other predefined regions. Nowhere do these claims teach that the sequence of the oligonucleotides in a first predefined region can be identical to the sequence of the oligonucleotides in another predefine region. For that reason, the Fodor claims would not anticipate the Southern claims 17-21 and 23-44.

b). Assuming that Fodor's claims 1 to 26 were prior art, the Fodor claims would not render obvious Southern claims 17-21 and 23-44. While there may be prior art which may show different regions can contain oligonucleotides having identical sequences, there is no motivation to modify the Fodor claims with this prior art.

For the foregoing reasons, the second branch of the two-way test is also not met.

IV. Conclusion

Based on the foregoing discussion, Southern respectfully submits that since both branches of the two-way test for an interference-in-fact are not met. Consequently, an interference-in-fact would not exist between the Southern claims and the Fodor patent claims.

D. New Information Disclosure Statement

There is submitted concurrently herewith an Information Disclosure Statement. The IDS cites references of which the Applicant has become aware. The IDS further includes copies of the latest Office Actions in copending application Serial Nos. 09/422,803 and 10/115,077. The record should also reflect the existence of copending application 10/772,467 which was discussed during the interview in which no Action has yet issued.

Favorable reconsideration and allowance is solicited.

Respectfully submitted,

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